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The Fable of Land Reform:

Leases and Credit Markets in Occupied Japan

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Abstract: Development officials and scholars routinely argue that land reform can raise productivity. It may not always do so, but it can -- and during 1947-50 in Japan it did.

Land reform may or may not sometimes raise productivity, but it did not raise it in Japan. The claim that it did is a fable, a tale people tell and re-tell because they wish it were true. A lease is a credit transaction -- a way for local elites (tied to local information networks in ways that banks can never be) to extend funds to farmers. Elites could lend money directly, but would need to create a security interest to protect their loans. Most local elites lacked the university education necessary to manipulate the legal procedures involved. By contrast, a lease let them protect their funds simply by retaining the right to evict tenants who fail to pay. As such, it represented a way for investors and farmers jointly to economize on credit market costs. The Japanese land reform program effectively banned this transaction-cost economizing credit-market strategy, expropriated the wealth of the investors who used it -- and cut the rate of growth in agricultural productivity.

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The end came in August. The war had been long and it had been brutal, but it came to an abrupt close in the summer of 1945. To govern the now-defeated Japan, U.S. President Harry Truman sent Army General Douglas MacArthur. Over the course of the next several years, MacArthur's staff (SCAP, for the Supreme Commander of Allied Powers) would dictate the terms of a draconian "land reform" program. In 1941, Japanese farmers had cultivated 5.81 million hectares (1 hectare = 10,000 square meters, or 2.47 acres). Of that amount, they had owned 3.13 million hectares (54 percent) and rented 2.68 million (Teruoka, 2003, 133; Nochi, 1957, 647). They had farmed 3.17 million hectares of irrigated rice paddies. Of that, they had owned 1.48 million hectares (47 percent) and rented 1.69 million (id.).

Through the Japanese government, MacArthur's staff expropriated 1.76 million hectares (66 percent) of the rented land from its owners and gave it to its renters. For obvious rhetorical ends, they spoke of taking the land from the "feudal" and "parasitic" landlords and giving it to their "immiserated" "peasants." Of the rented paddies, they expropriated 996 thousand hectares (59 percent). Nominally, the Japanese government paid for the land and resold it to the renters. In truth, it paid so little that it effectively "took" the land. It charged so little that it effectively gave it away.

Scholars immediately declared the program a "success," and in the academic imagination a success it has remained ever since. Six decades past, it continues to inspire development scholars and officials at the World Bank and United Nations. At the hands of men like Robert Mugabe, "land reform" elsewhere has often lurched from blood bath to famine. In the development literature, the Japanese program has stood guard to the faith that it need not be so. Done right, land reform can indeed spur agricultural productivity.

In fact, the standard account of Japanese land reform is a fable -- a tale people apparently tell and re-tell because they wish it were true. The Japanese program did not speed productivity growth. Instead, it slowed it. In many areas, the leases had served as the preferred mechanism by which investors extended credit to farmers. Land reform blocked this mutually advantageous option for finance, and -- in the process -- slowed the rate by which productivity grew.

Farmers in pre-war Japan faced two potential sources of funds: local elites and banks. Of these, the local elites had the informational advantage. They knew the potential borrowers, the land, the weather, the agricultural technology. If they advanced money directly as a loan, however, they needed to create a security interest in the land that the farmer bought with it. Literate and numerate as these investors assuredly were, most lacked the university education necessary to manipulate the legal procedures involved in creating security interests. Banks had the university-trained officers who could create the security interests, but they were not local. As outsiders, they lacked the informational edge in the local credit market that the village elites enjoyed.

Leases gave local investors a simple but effective way to protect their funds. Rather than lend farmers the money directly, they bought land with the funds and leased it. If a farmer defaulted on the rent, they evicted him and moved on. The process was easy to understand, and simple to enforce. Through it, the funds moved to the farmers

who presented the best projects, and farmers and investors jointly economized on the transaction costs inherent in credit market arrangements anywhere.

Post-land-reform, farmers owned almost all the land, but lost their access to additional capital. Post reform, they were richer than they had been, but no longer had access to the extra funds they needed to maintain their fields or adopt new technology. Cited regularly as an example of the way redistribution can increase the rate of productivity growth, the program slashed it. This need not imply that a better designed program might not raise productivity somewhere else. But in Japan, land reform slowed the rate of productivity growth.

I begin by exploring the literature on the economics of agricultural land tenure (Sec. I). I describe the Japanese farming sector in the immediate pre-war period (Sec. II.A.), and SCAP's land reform program (Sec. II.B.). And I recount the "fables" about pre-war land tenure and post-war land reform (Sec. II.C.). In Sec. III, I turn to the empirics.¹ If, as development officials insist, land reform increased incentives to produce, then productivity gains should have been largest in the areas where the government transferred the biggest fraction of land. Instead, they were smallest. I close in Sec. IV. by noting additional ways that land reform stalled the introduction of more efficient farming techniques.

I. Agricultural Land Tenure -- The Literature

A. Introduction:

Within the academy, we study the economics of land tenure along two largely independent lines. One group traces its genealogy to development economics, a second to Ronald Coase and transaction-cost economics. One focuses on agriculture in the under-developed third world, the second on modern North America and the western European tradition. One writes extensively about land reform, usually favorably; the second has left it largely unexplored.

B. Within Development Economics:

1. Land tenure. -- Scholars in the development economics tradition focus almost entirely on the under-developed third world. Relevant to land reform, they identify in these societies two apparent empirical regularities. First, productivity falls with farm size (e.g., Rosenzweig & Binswanger, 1993; Bardhan & Mookherjee, 2005; Binswanger, Deininger & Feder, 1995, 2693-94). This apparent negative correlation raises several obvious questions.

First, why should agriculture show these diseconomies of scale? Within this tradition, scholars imply that farmers invest greater effort and care in farms they own. Sometimes, they attribute this differential in effort to "imperfections in labor, credit, and land markets" (Binswanger, Deininger & Feder, 1995, 2700). Second, might farmers select different types of land for small farms than they do for large? For the most part, scholars in this tradition argue that they adequately control for land quality in their productivity regressions, though they do identify problems in the empirical estimates (id., at 2702-04).

¹ My data are prefecture (the equivalent to the states in the U.S.) level; for many variables, this is the smallest unit available. Unfortunately, this prevents me from examining variation within prefectures, and the small n precludes IV specifications.

Third, why would the owners of the large farms not divide them into smaller units and sell them to landless farmers (Ghatak & Roy, 2007, 254)? By hypothesis, the new owners could farm the land more productively than the old. Necessarily, the two groups of farmers should be able to negotiate a mutually beneficial transfer. As with the question of farmer effort, the answer apparently turns on non-clearing markets, particularly credit markets (Ghatak & Roy, 2007, 268; Banerjee, 1999; Besley & Ghatak, 2010, 4527, 4537; Binswanger, Deininger & Feder, 1995, 2699). The credit market does not clear, scholars write, and landless peasants consequently cannot raise the funds they need to buy the land. As World Bank economists Binswanger, Deininger & Feder (1995, 2664) explain in the Handbook of Development Economics:

[T]he great variations in land relations found across the world and over time cannot be understood in a simple property rights and markets paradigm. ... Landowning groups [have] used coercion and distortions in land, labor, credit, and commodity markets to extract economic rents from the land, from peasants and workers, and more recently from urban consumer groups or taxpayers.

In short, the owners of the large farms refuse to sell to the more efficient smaller-scale farmers because they earn rents from the market distortions that more than offset their own inefficient farming practices.

2. Land reform. -- Within this tradition, the need for coercive land reform follows straightforwardly. Posit that (A) land currently farmed in large-scale units would be more productive if distributed among landless peasants in smaller units, but (B) problems in the credit (and other) markets prevent those peasants from buying the land. If the government forceably divided the larger farms and distributed the land among the landless, it would not just produce a more egalitarian world. It would also raise productivity. As Binswanger, Deininger & Feder (1995, 2644-45) put it:

Because land ownership distribution has often been determined by power relationships and distortions, and because land sales markets do not distribute land to the poor ..., land reform has often been necessary to get land into the hands of efficient small family farmers

And scholars in this tradition assert that land reform programs have indeed raised productivity (Binswanger, Deininger & Feder, 1995, 2685; see also Deininger, 2012, 241; Deininger & van den Brink, 2000):

Since the end of World War II, landlord estates in Bolivia, large areas of China, Eastern India, Ethiopia, Iran, Japan, Korea, and Taiwan have been transferred to tenants in the course of successful land reforms. Theoretically, the productivity gains associated with such reforms come about because of improved work and investment incentives associated with increased security of tenure. ... Empirical evidence shows that the reform of landlord estates led to considerable investment, adoption of new technology and increases in productivity

"Theory and empirical evidence," write World Bank officers (1993, 160), "suggest that widespread ownership of land not only improves equity but also improves land productivity." United Nations studies make much the same claim (Ghai, et al., 1979, 9; see United Nations, 1976): "radical land reform can, at a stroke, remove the deadweight of landlordism and install a system of egalitarian peasant farming which ensures growth without mass

destitution." As an example, they cite Japan (Berry & Cline, 1979): "land reform in the early 1950s proved extremely successful in Japan, Taiwan, and Korea."

Of all the land reform programs examined, scholars have studied most intensively the reforms in India -- but there they reach mixed results. Banerjee, Gertler & Ghatak (2002), for example, compare district-level productivity data from 14 districts in West Bengal (where the government regulated tenancy) and 15 in neighboring Bangladesh, (where it did not). They conclude that productivity rose more rapidly in the former than in the latter. Other than in West Bengal, however, Ghatak & Roy (2007, 253, see 261) find that land reforms instead lowered productivity:

Overall, land-reform legislation seems to have had a negative and significant effect on agricultural productivity in India. However, this hides considerable variation across types of land reform, as well as variation across states.

C. Within Transaction-Cost Economics:

1. Fixed-rent contracts and sharecropping. -- A second set of scholars have tried to understand agricultural contracting through transaction-cost economics. Coase (1960) of course showed that, absent transaction costs, the initial allocation of property rights would not affect the way people used resources. From that basic observation, Cheung (1969) reasoned that -- again, absent transaction costs -- fixed-rent and sharecropping contracts in agriculture should generate identical levels of effort, investment, and production.

Cheung (1969) then asked why some farmers do use one contract rather than the other. Adam Smith (1992 [1776], 376) had claimed that sharecropping caused inefficient farming by slashing a farmer's incentives. In a world with positive monitoring and enforcement costs, it might indeed have that effect. Cheung concluded that farmers nevertheless chose share-cropping contracts because they let the farmers share the risk of harvest variability with their owners. His work generated a large literature, of which Stiglitz (1974) and Alston & Higgs (1982) represent two of the more prominent.

The argument that risk-sharing might explain sharecropping contracts, however, presented an empirical problem: apparently, the evidence is not there. In a careful study of 3,000 contracts among American farmers and micro-level information on another 1,000 farms and 2,500 pieces of land, Allen & Lueck (2002) found no evidence that farmers use sharecropping contracts to spread risk. Rather than risk-aversion, the choice between sharecropping and fixed-rent contracts turned on "measurement costs" and other facets of transaction costs more generally. Others who have questioned the risk-sharing hypothesis include Akerberg & Botticini (2000, 2002), Alston, Datta & Nugent (1984), and Eswaran & Kotwal (1985).

2. Leasing and quasi-rents. -- Yet to focus on when farmers choose one land-rental contract over another ignores the preliminary question: whether to rent at all (Allen & Lueck, 2002, 139). Scholars in the transaction-cost tradition have developed a sophisticated theory about when industrial firms own their own assets. Hart & Moore (1990; see Hart [1995]), for example, note that when work requires asset-specific skills, the asset's ownership can affect an employee's willingness to invest in the necessary skills.

Williamson (1979), Masten (1985), and Klein, Crawford & Alford (1978) similarly discuss the "appropriable quasi-rents" created by firm- or asset-specific investments.

As crucial as the contracting problems raised by Hart & Moore (1990) and others may sometimes be, however, in farming they matter only weakly. Allen & Lueck (2002, 36, 5) dismiss them forthrightly: "in general, [quasi-rents] in agriculture are absent"; the risks created by sunk investments "tend[] to play a minor role" in farming. These contracting problems do plague irrigation facilities. One party will invest in the facilities in one period in order to earn returns in later periods. The facilities themselves are inextricably tied to the land, and require costly maintenance. Without belittling the attendant moral hazard, however, note that these are problems that members of rural communities often mitigate through reputation bonds. Allen & Lueck (2002, 37) observe the phenomenon in the modern U.S.; even more would one have observed it in pre-war Japan. As Allen & Lueck (id.) put it:

Farmers are often part of a community of people who have known each other most of their lives. ... Information travels fast in such a community, and people are quickly aware of anyone who cheats another and tend to avoid future dealings with that person. ... Accurate assessments of farmer and landowner behavior will be made over time, and those farmers and landowners who attempt to gain at each other's expense will find that others may refuse to deal with them in the future.

3. Leasing and credit. -- (a) Functional equivalence. Sometimes, the choice between leasing and buying (with borrowed money) turns instead on transaction costs specific to credit markets. Leases and loans both represent ways for investors to extend credit. As such, a lease is not an alternative to the credit market, and neither is it a contract that investors and farmers adopt only when forced to adopt because of imperfections in the credit market. Instead, investors can extend credit to farmers through either a loan or a lease, and they choose the latter when it more efficiently economizes on the transaction costs inherent in any credit market: on the cost of information about borrower quality, and on the cost of creating and protecting the investor's interest in the funds conveyed.²

In developing economies like pre-war Japan, banks and local elites (think successful farmers, sake brewers, factory owners) tend to extend credit through different means. Banks lend money directly; they protect their interest in the funds through court-enforceable security interests. Local elites lend money indirectly by buying land in their own name and leasing it to a farmer; they protect their interest in the land by retaining a right to evict.

The logic is simple. Take two parties, investor I and farmer F. I has capital; and F runs a business. F has a profitable use for an asset in his business; and I either owns the asset or can readily buy it. I expects to earn a return on his money (or on the asset he buys with the money); and F is willing to pay for the use of the money (or asset). I and F could structure a mutually beneficial arrangement in two formally different ways: (i) I could buy the asset (if he does not already own it) and lease it to F, or (ii) I could lend F

² For modern U.S. farmers the choice between leasing and buying often turns on tax considerations. See Ford & Musser (1994). The lease-loan equivalence was central to "safe-harbor leasing" under Reagan-era tax reforms. See Chiorazzi (1985).

the money and let him buy the asset himself. Add the appropriate contractual detail, and the two arrangements generate functionally identical results.

For example, if I rents (leases) F an asset (like land), F will obtain the right to use it, and for that use will make regular rental payments to I. If I lends money to F, F will buy the asset, and for the use of the money will make regular interest payments to I. In either case, I will earn a market return on his money and F will obtain the use of the asset. In the first case, F becomes a "tenant," and in the second he becomes an "owner." In either case, however, F obtains the right to use the asset, and I earns a return that reflects the time value of money and the risk of F's nonperformance.

(b) Protection. In agricultural markets, leases present two transaction-cost advantages over bank loans. First, investors (particularly investors with less formal education) can more easily protect themselves through a lease. If I and F use a lease to convey the funds, they will negotiate the amount of the rent, and perhaps a few other terms like the maintenance of irrigation facilities. If F defaults, I will throw him off the land and rent to someone else.³

If I and F use a loan, I will need to take and record a security interest in the land F buys with the money. Pre-war Japan did offer this option; in some less-developed countries investors cannot obtain readily enforceable security interests even if they wish. Although a university-educated bank officer in pre-war Japan would not have found the process hard, few local elites had a university education. Most had attended only elementary school. They were literate and numerate, but would have found the procedures for taking and recording security interests hard to master. For them, a lease provided the same security at lower cost.

(c) Information. Second, these less-well educated local elites had much better information about the potential borrowers than bank officers. After all, they were local, and many of them farmed themselves. They knew the potential farmers, the local paddies, the local variations in micro-climates, and the relevant farming technology. They were part of the local informational network that enforced Alley & Lueck's reputation bonds (Sec. C.2., above).

By contrast, banks recruited most of their officers from outside a community. They understood the value of local information, but they needed university-educated officers. Few students from farming villages in pre-war Japan attended universities, and if they did attend they did not return to their village upon graduation. To recruit trained officers who could document, record, and enforce a security interest in a loan, a bank had little choice but to hire from outside a farming village.

³ The power to evict depended in part on whether the investor and farmer negotiated their agreement as a contractual right (*saiken*) or a property right (*bukken*). If a property right, the renter could claim a minimum 20-year term (Minpo, Sec. 278), could assert his interest against a later buyer of the farm, and could sell his leasehold (Sec. 272). The landlord could evict him only if he failed to pay rent for two years (Sec. 276). If the lease was a contractual right, the tenant had less power, but 1924 legislation did give him some leverage. See Adachi (1959, 81-82); Tanabe (1974, 603-21). In some areas of the country, an owner could not evict a renter without paying a substantial eviction fee (Norin sho, 1928). Given this security, tenants could (and did) sell their leasehold.

In short, in developing economies like pre-war Japan, agricultural leases potentially dominate bank loans. Local elites have better information about the borrower pool than banks, and may find it cheaper to protect their investment through a lease than a security interest. In communities like these, leases need not represent "second-best" alternatives to bank loans, and their use need not reflect a problem in the credit market. Instead, the lease is itself a credit extension: investors and farmers choose leases rather than loans when leases -- in their world -- better economize on standard credit-market transaction costs.

II. Japanese Agriculture at Mid-Century

A. Land Tenure in Pre-War Japan

Japanese farmers grow their rice in meticulously irrigated paddies. Farmers anywhere need to plow, fertilize, weed, and harvest their fields. To grow rice in Japan, they need to do much more. They need to build a clay base, level it, add topsoil, encircle the field with waterproof dikes, and connect it to the vast network of communal irrigation sluices that traverse the village fields. They plant their seeds in one flooded field, transplant the seedlings to a bigger flooded paddy, and then drain the field as the plants mature. Their capital investment is massive and front-loaded: on the rocky, dry, hillside, they must create the paddy. But it is also on-going: against the perpetual deprecations of the weather, they must maintain the soil, the dikes, the irrigation canals.

Japanese farms have long been small. Pre-land reform, those who owned farmland owned a mean 1.16 hectare (1935 figures; Nochi, 1951, 598). In 1940, of the 5.00 million owners, only 2,941 owned 50 hectares (123 acres, U.S.) or more. Of that number, 1,199 owned the land in the far northern island of Hokkaido (land better suited to dairy farming than rice). Nearly half of the owners (47.6 percent) owned less than half a hectare, and only 7.5 percent owned more than 3 hectares (Nochi, 1951, 599).

Like modern American farmers (see Allen & Lueck, 2002: 11), pre-war Japanese farmers mixed ownership and rental. Some cultivators farmed both land they owned and land they rented. Some farmed some of the land they owned, but rented some of their land to others. And some simultaneously farmed some of their own land, farmed some land they rented from others, and rented out some of their land. As of 1941, 28 percent (1.52 million households) of the 5.41 million farm households owned no land. Another 28 percent (1.49 million) farmed only the land they owned. The rest farmed their own land and rented fields besides (Nochi, 1957, 646).

These farmers obtained 26 percent (695 thousand hectares) of their rented land from "absentee" owners -- men and women who lived outside the area. The rest they obtained from local owners (Nochi, 1957, 647, 624). In significant part, absentee land ownership was a creature of Hokkaido and the urban centers. After Hokkaido, the three prefectures with the largest fraction of farmland (not just leased farmland) held by absentee landlords in 1945 were Tokyo (at 11.7 percent), Osaka (10.6 percent), and Miyagi (9.0 percent; seat of the city of Sendai).

Japanese farmers leased most of their rented land under fixed-price contracts. Sharecropping contracts they rarely used (Arimoto, 2010, 295, 298). As in a wide range of societies (Basu, 1984, 1930), the rent typically came to about half of the harvest. According to one 1928 study (Norin sho, 1928), as a fraction of the yield the prefectural

average contractual rent ranged from 0.33 to 0.61, with a mean of 0.498 and a median of 0.50.

To mitigate the harvest risks that fixed rent contracts imposed, Japanese farmers took several steps. First, they farmed scattered plots of land (Smith, 1978, 75). Microclimates vary across a village, and like farmers in pre-enclosure England (McCloskey, 1991) they reduced the risk of crop failure by tilling a portfolio of dispersed fields.

Second, farm households pooled their agricultural incomes with unrelated by-employment (Smethurst, 1986, 21-22). In some families, one member might spin silk thread through putting-out arrangements. In others, a member might run a small store or work as a carpenter. And in many families, young, unmarried sons and daughters left for several years to work in a city. In the mid-1930s, between 5 and 6 million households farmed (Norin suisan sho, 2003, 12-17), but over a million young men and women temporarily left those homes for a job in another prefecture. Many others left their homes for a job but stayed in the same prefecture.

Third, farmers usually negotiated a fixed rent contract that was not quite fixed. Instead, they negotiated a contract that included a rent adjustment in case of unusual harvests (a custom similar to one found in the contemporary U.S.; Allen & Lueck, 2002, 63).⁴ Effectively, as Cheung (1969, 32) explained it, the owner bundled an insurance contract with the land. He agreed to bear part of the risk that the crop might fail, and in exchange charged the farmer a higher rent.

B. The Land Reform Program:

Almost immediately upon taking power, SCAP decided to redistribute farm land to the renters. The Japanese government had enacted one "land reform" program in 1946, but SCAP declared it much too timid. It drafted a more draconian program, presented it to the Japanese government, and had it enacted later that year.⁵

By 1949, SCAP had forced the Japanese government to transfer about 2 million hectare of farmland, including 1 million hectare of irrigated paddies. As of 1941, farmers had rented 46 percent of their land. After the SCAP-mandated transfers, they rented only 10 percent (Teruoka, 2003, 133; Takemae, 2002, 344; Sasaki, 2005, 737).

Under the terms of this program:⁶

- a. Local owners of leased land could keep 1 hectare (4 in Hokkaido) to lease out. The rest they sold to the government, which in turn resold it to their lessees.
- b. Absentee owners could keep nothing.
- c. No farmer could own more than 3 hectares of farmland (12 in Hokkaido).

⁴ E.g., [No names given], 4019 Horitsu shimbun 39 (Sup. Ct. Apr. 9, 1936); [No names given], 16 Horitsu gakusetsu hanrei hyoron keiho 112 (Sup. Ct. Oct. 5, 1926).

⁵ Jisaku no sosetsu tokubetsu sochi ho [Special Measures law Concerning the Establishment of Owner Farmers], Law No. 43 of Oct. 21, 1946 (hereinafter SML); Nochi chosei ho [Agricultural Land Adjustment Act], Law No. 67 of Apr. 2, 1938, as amended by Law No. 64 of Dec. 28, 1945 and Law No. 42 of Oct. 21, 1946 (hereinafter ALAA).

⁶ See SML, supra note, at Secs. 3, 6, 43 as supplemented by land reform committee decisions; ALAA, supra note, at Sec. 9-8; see Takagi (2008, 214); Hewes (1950, 29-33).

- d. Lessors could charge no more than 25 percent of the harvest for paddy fields, 15 percent for dry fields.
- e. And the government would buy and resell the land at prices based on the capitalized value of the rental rates used for tax purposes in 1938. It could pay the owners in 30-year bonds.

Crucially, note that SCAP imposed identical terms on all parts of the country other than Hokkaido. Land reform programs in countries like India have involved rules that were arguably endogenous to the communities affected (Ghatak & Roy, 2007). The Japanese program was as close to exogenous as any could be.

SCAP could not take 2 million hectares from large-scale absentee landlords. Large-scale landlords did not own anything close to 2 million hectares. At a time when the Japanese population numbered 80 million, they took land from 2.4 million owners and distributed it to 4.3 million renters (Nochi, 1957, 619, 632; Nochi, 1980, 38, 40, 43; Sasaki, 2005, 737). In effect, they reached far into the middle class, and took from anyone who happened to have invested his savings in farmland (Flath, 2000, 75).

For "take" the team did. Nominally, the Japanese government bought from landlords and offered tenants the option to buy. It bought and offered, however, at prices the team had deliberately keyed to 1938 values. Given the intervening hyperinflation, this let it buy the land for trivial amounts. From 1939 to 1949, nominal prices had jumped 150-fold (Flath, 2000, 74). Wrote one historian (Takemae, 2002, 344; see Sasaki, 2005 738), the lessees "acquired property rights for what amounted to the cost of one salted salmon per 0.1 hectare."

Predictably, landlords fought the "reform."⁷ If they sabotaged the actual process, though, little record of it remains. Instead, Dore (1959, 172) describes the transfers as primarily "peaceful and orderly." Plausibly enough, he attributes the order to "the overwhelming power" of the American army (id., 172-173).

Nevertheless, SCAP staff feared that the beneficiaries of their program would promptly unwind it. They could take from the owners and give to the farmers, but they worried that the farmers would sell the land back and pocket the cash. They seem not to have understood quite why investors and farmers pre-war had negotiated the arrangements that they had. Yet they did apparently sense that those underlying dynamics (whatever they might have been) might drive the two sides back to their earlier equilibrium.

To forestall that return, SCAP staff imposed an additional set of rules. By 1952, these rules would become part of the basic Agricultural Act,⁸ and in modified form would shape the industry for decades (discussed more fully at Sec. IV., below). No one could own more than 3 hectares of paddy land. No one could rent out land in another community. And no one could buy paddy land without clearing his purchase with a local agricultural land committee.

C. Land Tenure and Land Reform as Fable:

⁷ Dispossessed landowners sued on the ground that the SCAP-imposed program violated the "takings" clause of the SCAP-imposed constitution. The Supreme Court held the program constitutional. *Hoshina v. Koku*, 7 Saihan minshu 1523 (S. Ct. Dec. 23, 1953) (en banc).

⁸ Nochi ho [Agricultural Land Act], Law No. 229 of 1952; see generally Tanabe (1974, 1036-61).

1. Pre-reform tenure. -- (a) The fable. SCAP staff described the world on which they imposed their land reform in nearly Dickensian terms. The country needed "to destroy the economic bondage which [had] enslaved the Japanese farmer for centuries of feudal oppression," it announced (SCAP, 1945). Farmers had lived within "an archaic, oppressive, and entrenched system of tenancy" (Hewes, 1950, 11). Desperately, they needed it gone.

Archaic, oppressive -- and "exploitative." SCAP echoed Japanese intellectuals of the time, and modern scholars continue to echo SCAP. According to one historian (Fukui, 2011, 56; see also Dower, 1993, 112; Nakamura, 1971, 51; Kosai, 1986, 21), "the landlord exploited his tenants as much as he wished. Because he charged such a high fee, his tenants lost their will to work, and production stagnated." In the words of SCAP bureaucrat T.A. Bisson (1941, 43), the landlords were "parasites ... intent only on drawing high rents"

Some landowners also lent money, and by the standard accounts they lent money as exploitatively as they rented land. Hane (2003, 23) captures the flavor of this approach. The "rapacious" money lenders "charged usurious rates," he reports. They "were merciless in collecting what was due."

Extortionate rents, usurious interest -- given the economic pressure they faced, farmers who owned land lost it, and those without land struggled simply to survive. "Farmowners continued to lose their land and the rate of tenancy steadily increased," explains Hane (2003, 27). Landless farmers "in 'underdeveloped' areas, in particular, lived on the razor's edge, because of the constant threat of crop failure caused by bad weather" (id., 103). "Crop failures, illness, a fall in the price of rice coinciding with the expense of a wedding or a funeral where social custom would permit of no stinting -- the factors leading to the sale of land recurred," writes sociologist Ronald Dore (1959, 19). "Owner-cultivators became tenants as they lost their land plot by plot."

(b) Initial doubts. But did "owner-cultivators" lose their land "plot by plot"? Some did, of course. Some firms go bankrupt in any competitive industry, and agriculture is famously competitive everywhere. The tenancy rate did rise during the first half of the century. In Table 1, I include the numbers Nakamura (1971, 56) cites (and they are indeed the standard numbers): from 1887 to 1932, the tenancy rate climbed steadily.

[Insert Table 1 about here.]

But did the tenancy rate rise because market competition and "rapacious" lenders caused farmers to lose their land? Next to Nakamura's tenancy figures, I add the amount of land under cultivation (Umemura, 1966, 226-27). Although the tenancy rate rose at the turn of the century, so did the amount of land farmers cultivated. By simple arithmetic, I back out of these columns the amount of land farmed by the "owner-cultivators" who Dore believes "lost their land plot by plot." The result is Figure 1.

[Insert Figure 1 about here.]

Other than two dips, the amount of owner-cultivated land rose steadily for half a century. Tenancy rates did not rise because the amount of land cultivated by owners fell -- because it did not fall. Instead, the amount of owner-cultivated land rose.

(c) The Smethurst hypothesis. How could tenancy rates rise in tandem with owner-cultivated acreage? In the mid-1980s, Smethurst (1986) advanced a hypothesis radically different from the rest of the literature:⁹ at the turn of the century, wealthy merchants and industrialists invested in large-scale land reclamation projects. They created new tracts, and leased them to local farmers.

Tenancy increased, in other words, because investors built new paddies and leased them to farmers who used the land to raise their incomes (Smethurst, 1986, 61-62). The growth in tenancy rates did "not reflect differentiation and the pauperization of small-scale farmers" (id., 66-67). It reflected instead the "improved opportunities for the rural poor." As Smethurst (1989: 417-18) put it, "the growth of a market economy brought better and better living standards to Japanese farmers as a whole between 1870 and 1940."

Investors and farmers negotiated these tenancies within a network of highly competitive markets. Most obviously, the urban labor market placed a cap on agricultural rents, and a floor under agricultural incomes. If an owner tried to charge a rent that left a farmer with less than he could earn in a factory (adjusted for amenities), the farmer could simply quit. He could take the factory job, and earn the higher income.

Information was not an issue. Farmers knew what they could earn in non-farm employment. Many of them diversified their household income by adding other jobs like silk spinning, and many sent their sons and daughters to work several years in the city before they returned to marry.

Neither was quitting agriculture an issue. Farmers abandoned the industry regularly. From 1912 to the late 1940s, the Japanese population grew 60 percent -- from 50 million to 80 million (Takage, 2008, 28). Over the same period, the number of farm families grew only 15 percent -- from 5.4 million to 6.2 (Norin, 2003, 12-17). Given that farm couples raised large families, the majority of their children must have abandoned the farm.

And farmers had the knowledge they needed to incorporate available technological and scientific improvements. They knew the conditions in their local community. They knew the paddies in the area. And they had access to scientific and engineering expertise. By the 1920s, nearly everyone had attended elementary school (Ramseyer, 2012, tab. 2). Farmers did not attend university, but they could read and handle basic arithmetic. Given the already-elaborate bus and train networks, they could travel to urban areas with ease (Ando, 1979, 12).

2. Land reform. -- (a) The fable. When development economists and World Bank officers claim that the Japanese land reform program raised productivity, they echo claims by historians of Japan. Farmers who own rather than rent have stronger incentives to boost production, historians explain, and the post-war land reform gave Japanese farmers those stronger incentives. These claims are extremely common: e.g., Sasaki (2005, 738); Shimizu (2007, 345); Takagi (2008, 42); Moehwald (2004, 264); Kosai (1986, 22); Teruoka (2003, 138); Minami (1986, 70); Isobe (1979, 4); Miwa (2012, 164-

⁹ For which his historian colleagues excoriated him viciously. One writer (in time, he would become president of SUNY New Paltz) added what he obviously thought the ultimate insult (Bowen, 1988, 828): Smethurst's book was positively "Reaganesque." See Ramseyer (2012).

65). As University of Tokyo economic historian Takafusa Nakamura (1995, 29-30) put it:

[T]his stringent reform had the effect of rapidly increasing the productive capacity of rice-growing land in such areas as Hokkaido, Tohoku, Hokuriku, and Tozan -- generally the northeast half of Japan -- where large landlords had been especially powerful After the transfer of property rights, land improvements were carried out on a large scale and combined with the introduction of new rice-growing technology to raise the level of agricultural productivity.

In the most careful study of the Japanese program in English, even sociologist Ronald Dore claimed the reforms raised productivity. He could not find the evidence, he scrupulously reported (1959, 217). But the reforms must have raised productivity. By the late 1950s Japanese farms had grown more productive, and "land reform must be given considerable credit" (id., 216). After all, the program let renters avoid landlords who might have fought change. It gave them "greater incentive to carry out improvements on, and to maintain the fertility of, the land" (id., 216). It offered them the "psychological" benefit of believing that "their future [was] in their hands" (id., 217). And it supplied them with the capital they would need for any improvements. Given all this, concluded Dore, it must have raised productivity.

(b) Initial doubts. Yet recall that the land reform could not have raised a farmer's incentives. Japanese farmers leased their land under fixed-rent contracts: they already captured the entire marginal value-added that they created. Whether they owned or leased, they earned the full value of any increased production that they might generate. What is more, they had access to information about productivity-enhancing improvements. And if they had ideas for capital improvements, they could negotiate advances from their landlords.

Given these conditions, most of the farmers would have operated near their production-possibility frontier. If so, then transferring title to them would not have raised output. As agricultural technology improved, productivity would have risen. But it would have risen at all farms, whether owned by the cultivator or no.

Recognizing this logic, Flath (2000, 74) writes in his text on the Japanese economy that the land reform program "almost certainly did not" increase productivity. It "may have transferred wealth from landlords to cultivators, but it did not stimulate agricultural production, or eliminate wastes and inefficiencies."

Flath shows the right instinct, but at the time he wrote his book the evidence was not there. The best test to date has been Kawagoe (1995).¹⁰ Kawagoe proposes a simple correlation. He first measured the productivity increase in the 46 Japanese prefectures from 1923 to 1959. He then asked whether that increase correlated with the fraction of rented paddies in each prefecture in 1923. He found no statistically significant correlation, whether positive or negative. The conventional claim, however, was that tenancy prevented communities from improving productivity. Those areas with high tenancy rates would have had lower productivity growth pre-reform, and higher growth thereafter. Unfortunately, by comparing 1923 tenancy rates against productivity growth

¹⁰ More tentative studies, suggesting (but not showing) the lack of any boost to productivity include Kawano (1969), Kaneda (1980), and Hayami (1988, 45).

over the entire 1923-1959 period, Kawagoe conflates the two periods. If the land reform had raised productivity, his test would not have shown it.

III. Land Reform and Productivity

A. The Exercise:

To test whether land reform raised productivity, I break productivity measurements at the point of the reform, and ask whether prefectures with the largest transfers saw the fastest productivity growth after the reform. I take as my main independent variable the fraction of paddy land transferred under the land reform program. As additional independent variables, I add pre-war productivity measures, characteristics of the lease contract, demographic controls, and measures of credit availability.

Given the straightforward nature of this exercise, I do not outline a formal model. Instead, I refer interested readers to Allen & Lueck's (2002: 142) clear model and discussion. In exploring a farmer's decision to buy or lease, Allen & Lueck model his production as a function of his effort, contractually specified qualities of his land, unspecified and thus unpriced qualities of his land, and a randomized component reflecting the weather. They treat the marginal product of effort and land quality as positive and diminishing, and each variable as independent of the others.

Crucially, although development economists generally argue that many of the factor markets do not clear, Allen & Lueck (2002: 142, 6) present a model where "competitive rental markets exist for all inputs":

Competition among farmers for land, and among landowners for rents, and competition between on- and off-farm opportunities generally determine the returns to individual factors of production within narrow bounds.

Like Allen & Lueck (2002), I hypothesize that agricultural factor markets in pre-war Japan did indeed clear. Local elites and banks competed to offer enterprising farmers credit. Agricultural and non-agricultural employers competed for workers. Wholesellers and retailers competed to buy agricultural produce. And a wide variety of firms competed to sell fertilizer and other supplies. If these markets cleared, then the leasing arrangements in place would have represented a competitive equilibrium, and the government would not have raised productivity by redistributing land and limiting contractual choice. In the article that follows, I ask whether productivity did indeed rise.

B. Data and Variables:

I create the following variables (see selected summary statistics in Table 2). All data are prefecture-level. Note that these prefectures represent the Japanese equivalent of the American states, and that the study thus covers the entire country. Although I would have preferred data partitioned at a more micro-level, the data for many of these variables are available only at the prefectural level. Note too that Banerjee, Gertler & Ghatak's (2002) study of land reform in India similarly includes only district-level data (14 districts in West Bengal, 15 in Bangladesh).

[Insert Table 2 about here.]

Fraction paddies purchased: Total paddy land bought under the land reform program by July 1950, divided by the total area of paddy land in 1941. Calculated from Nochi (1957).

Productivity, 1940: The amount of rice produced (in koku), divided by the area of paddy fields (in cho) (1 koku = 180 liters; 1 cho = .992 hectare). Calculated from Norin sho (tokei hyo; various years). The productivity rates for other years are calculated analogously.

Productivity growth, 1935-1940: $(1940 \text{ productivity} - 1935 \text{ productivity})/1935 \text{ productivity}$. Productivity growth rates for other periods are calculated analogously.

Absentee paddy ratio: Fraction of paddy land owned by landlords not living either in the town in which their land was located or in an adjacent town in 1945. Calculated from Norin sho (1956; kaiho jissey).

Absentee household ratio: Number of landlords not living either in the town in which their land was located or in an adjacent town in 1945, divided by the total number of farm households in 1947. Calculated from Nochi (1957).

Land-rent ratio: Mean sales price of one hectare of paddy in 1939, divided by mean rental price of one hectare in 1939. Calculated from Nochi (1981, v. 13; shiryō shusei).

Rent-paid ratio: The mean rent actually paid for paddy land in 1928, divided by the mean contractually specified rent for paddy land in 1928. Calculated from Norin sho (1928; kosaku jijo).

Fraction population rural: Non-urban population in 1950/total population in 1950. Urban areas are municipalities with population of at least 100,000. Calculated from Sorifu (1952).

Bank branches per capita: $(\text{Number of bank branches in prefecture in 1925})/\text{population in 1925}$. Calculated from Okura sho (1926); Fukumi (1928).

Paddy area growth, 1920-25: $(1925 \text{ paddy area} - 1920 \text{ paddy area})/1920 \text{ paddy area}$. Calculated from Norin sho (tokei hyo; various years). Paddy growth rates for other years are calculated analogously.

C. Results:

1. Basic results. -- At the half of the prefectures where the land reform program transferred the largest fraction of paddy land during 1947-1950, productivity in rice rose 14.3 percent over 1950-1955; at the half where it transferred the least land, it rose 22.0 percent. Productivity climbed 65 percent slower at the prefectures where the government expropriated the most land.

In Table 3, I regress (OLS) productivity growth in rice from 1950 to 1955 against the fraction of paddy field transferred under land reform during 1947-1950. Consistently, the effect is negative: those prefectures where SCAP redistributed the largest fraction of paddies showed the slowest productivity growth in the succeeding half-decade. I include several specifications. In Regression (1) of Table 3, I use no controls. In Reg. (2), I introduce the prefecture-level productivity of paddy fields in 1940, and in Reg. (3) I use the prefecture-level change in productivity from 1935 to 1940. In the remaining specifications I add several other independent variables.

[Insert Table 3 about here.]

The land reform program has a consistently negative effect on productivity growth in all specifications. The effect is statistically significant at the 10 percent level in Reg. (2), at the 5 percent level in five of the other Panel A regressions, and at the 1 percent level in two. The effect of the program on productivity is also economically

substantial. Between 1950 and 1955, the median prefecture showed a productivity gain of .212. Given the magnitude of the coefficient in the first specification, a one standard deviation increase in the fraction of paddy confiscated lowered that productivity gain by .064. On a median gain of .212, this is a 30 percent cut.

In Regressions (4) and (5) of Table 3, I ask whether the type of landlord affected post-reform productivity. Recall that some historians call absentee landlords "parasitic." In Reg. (4), I add the fraction of tenanted land owned by absentee landlords; in Reg. (5), I add the ratio of the number of absentee landlords to all farm households. Both resulting coefficients are insignificant. Whether farmers had negotiated contracts with absentee -- "parasitic" -- landlords did not affect later productivity growth.

In Regressions (6) and (7), I ask whether the relative contractual power of renters and landowners affected post-reform productivity growth. To the extent that lessees negotiated contracts that gave them additional "power" against a landowner, land would sell for a smaller multiple of the rental stream. In Reg. (6), I introduce the ratio of sales price to rental price. To the extent that courts refused to enforce contractual terms against tenants, landowners would collect a smaller fraction of the contractually specified rent. In Reg. (7), I introduce the ratio of the rent actually paid to the contractually specified rent. Both calculated coefficients are insignificant.

2. Urbanization. -- Much changed in Japan during the 1940s. Between 1 and 2 million Japanese young men died in battle. U.S. bombers destroyed half the housing stock in Tokyo, and a quarter of all housing in the country (McClain, 2002, 506-07). And 7 million Japanese streamed home from Manchuria, Taiwan, and Korea (Gordon, 2003, 229).

Although these demographic shifts differentially affected rural and urban areas, so did the land reform program. To begin to disentangle these overlapping influences, consider several phenomena. First, the land reform program redistributed all absentee-owned land, and absentee owners tended to hold land near urban centers. Absentee rates were 7.6 percent at the six prefectures with the largest cities (Tokyo, Osaka, Nagoya, Yokohama, Fukuoka, Kobe), but only 5.4 percent elsewhere. The difference is significant at the 10 percent level.

Second, in part because the government confiscated all land held by absentee owners, it confiscated more land near these urban centers. At the six municipal prefectures, it confiscated 36.5 percent of the paddies. Elsewhere, it confiscated 31.1 percent. The difference is significant at the 5 percent level.

Third, the urban farms were more productive than the farms elsewhere. Although most of Japan is mountainous, the cities are located on the coastal plains. This makes economies of scale easier to exploit near the cities, and the productivity figures reflect that difference. At the close of the land reform (1950), paddies at the six urban prefectures produced 25.7 koku/cho, while those elsewhere produced 19.3. The difference is significant at the 5 percent level.

Last (and closely related to the third point), a farmer faced higher-valued alternative uses for paddies near the urban centers. If the demand for residential housing rose, he would not build a house on a random paddy. Instead, all else equal he would build it on his least productive paddy.

Whatever the reason, cultivators increased rice productivity more slowly at the urban prefectures. At the 40 non-urban prefectures, they raised productivity (yield/area) 20.7 percent over 1950-1955. At the six urban prefectures, they hardly raised it at all: an increase of 1.0 percent.

In Table 4, I add a variable equal to the fraction of the population living outside of cities (population > 100,000). The coefficient on the fraction of paddy land transferred under the land reform program remains negative.¹¹ In Regressions (1)-(3) using all 46 prefectures, the land-reform coefficient remains negative at a statistically significant level. In Regressions (4)-(6) using only the 40 prefectures other than the 6 urban centers, the coefficient is negative but not statistically significant. The coefficients on the fraction of population living in rural areas are not significant.

[Insert Table 4 about here.]

3. Bank accessibility. -- The land reform program radically disrupted the credit market. Most obviously, it effectively banned leases. It did not formally ban leases, but it limited the amount to 1 hectare per person and the price (in a world where the market rental was about half the yield) to a quarter of the yield.

Precluded from obtaining credit through a lease, farmers had little choice but to borrow. For that money, they could turn to banks. In Regressions (2)-(3) and (5)-(6) of Table 4, I regress productivity growth on the accessibility of a bank office (measured before the period). The coefficient on bank accessibility is consistently and significantly positive: the more bank branches per capita, the faster the rate of productivity growth. The effect is the same whether I regress productivity on all prefectures or only the 40 non-urban prefectures.

For several reasons, however, bank loans could not fully substitute for leases. Most obviously, local elites knew the community better than bank officers did, and could more accurately gauge the quality of local paddies and farmers. Second, land reform created a demand shock for which the banks would not have been prepared. To be sure, cultivators were richer post-reform, and would not have borrowed as much as before. But they still needed funds for many improvements, and land reform had caused much of the village elite to drop out of the credit market. The resulting demand shock would have caught banks off-guard. They would have lacked the staff to handle the increased loan applications. And they would have lacked offsetting assets in their portfolios to diversify any large increase in agricultural loans.

Last, after land reform banks could no longer protect themselves by taking a security interest in a farmer's field. Pre-reform, they could shield themselves against default by obtaining a security interest in the land. If the borrower defaulted, they could seize it and sell it at auction. Post-reform, banks could no longer do this. To be sure, the government did not formally ban security interests. But to stop tenants from selling their land back to their former landlords, it gave local agricultural land committees a veto over all farmland transfers. Post-reform, a farmer could buy land at bank auction only if he applied to the committee and obtained its approval in advance.

¹¹ If instead I use a simple population density measure, the coefficient on the land reform variable becomes statistically insignificant. See Ramseyer (2012).

As a result, if a bank repossessed a paddy from a defaulting borrower, it could sell the farm at auction only to whatever group of farmers chose to obtain that pre-clearance. This is not a gamble banks were willing to make (Kan, 2011, 45 n.4). Given the haphazard auction to which they can turn on default, if the only security a farmer could offer was his paddy most Japanese banks refused to lend.

Credit markets do eventually equilibrate, of course. In time (by 1955-1960, according to Tab. 5, Reg. (1)-(2)), banks and farmers apparently adjusted to the new environment. Perhaps they added the staff they needed. Perhaps they rebalanced their asset portfolios. Given their inability to enforce security interests against farm land, however, the quantity of credit would have equilibrated at a lower level (i.e., lower than if there had been no land reform) everywhere. After land reform, village elites no longer leased substantial land anywhere, and banks no longer lent on the basis of an agricultural mortgage anywhere.

[Insert Table 5 about here.]

4. 1955-1960. The differential effect of the land reform program across prefectures appears only in the early post-reform years. More specifically, it slowed productivity growth at (i) the prefectures where it transferred the most land, relative to (ii) the prefectures where it transferred less land, only during the first half of the 1950s. In Table 3, the coefficient on the fraction of land confiscated is consistently negative for 1950-55. In Table 5, I regress productivity growth over 1955-60 on the same land-reform variable. The resulting coefficient is now insignificantly different from 0 (Regs. (1)-(2)).

Crucially, however, the land reform program never spurs productivity growth. The claim that it does lies at the heart of the fable: land reform raises the pace of economic growth. In fact, by several specifications it lowers it over the first half of the 1950s. Although that differential drag in the cross-prefecture regressions disappears by the end of the decade, land reform never quickens the pace of the growth. Instead, by the end of the 1950s the areas most subject to the program merely recover from it, and cause productivity growth across the prefectures to converge.

5. Productivity levels rather than growth. -- In Regressions (3)-(8) of Table 5, I use the variables from Tables 3 and 4 to predict productivity at a given time rather than productivity growth over a given period. The results confirm much of the analysis above: that land reform hit hardest some of the most productive areas, that those areas hit a steep decline, but that they recovered their relative status by the end of the decade. Regressions (3)-(4) illustrate their initial (1950) relative productivity: land reform redistributed the most land at the communities with the most productive farms. Regressions (5)-(6) show the mid-decade decline: relative productivity at the areas hit hardest by the land reform program fell during the first half of the decade. Regressions (7)-(8) then demonstrate their eventual relative recovery: the formerly productive areas recouped their earlier preeminence by 1960.

IV. Long-term Changes

The damage caused by the land reform program extends far beyond the numbers in these regressions. The regressions ask whether the program raised the growth rate at those prefectures where it redistributed the most land -- relative to the rate at the other

prefectures. They show that it did not. They do not ask how the land reform program affected growth rates more broadly. They capture the effect it had on relative growth rates, but not on growth across the country as a whole.

At the national level, the program almost certainly caused long-term damage. Most obviously, the 3-hectare ownership maximum (and 1-hectare leasing maximum) prevented farmers from exploiting the new economies of scale. Before 1940, few such economies were to be had. The new post-1950 technologies, however, introduced those economies en masse. The ban on absentee and corporate ownership prevented farmers from reaping the benefits from a division of labor between investing and operating.

And the law stopped both the first- and the second-best means of extending agricultural credit. The investors with the best local information had been local elites. By capping rentals at 25 percent of the yield, the law prevented them from using leases to extend credit. In most cases, the next-best alternatives were the banks. By banning land transfers without the permission of the local land committee, the law prevented farmers from using their land as security for loans.

Over the succeeding decades, the Japanese Diet would loosen some of these rules. Ultimately, however, the restrictions that the SCAP staff had designed to prevent a return to pre-1940 tenure locked Japanese farmers into a miniscule scale whose inefficiency grew increasingly painful by the year. Over the course of the next decades, farmers would obtain access to technological improvements that required large outlays and large farms. They were improvements they could efficiently exploit only if they could leverage them over wide areas. Given the rules designed to lock-in the land reform program, they were improvements they could exploit only haphazardly at best.

V. Conclusions

Land reform need not just reduce rural poverty, write development officials and scholars. It can raise productivity. It will not always do this, but it can -- and in occupied Japan it did.

In fact, this account of Japanese land reform is a fable. Land reform in Japan did not raise productivity. Instead, it slowed the rate of productivity growth in the areas where it redistributed the most land.

Land reform apparently slashed productivity growth by interfering with the allocation of credit. In pre-war Japan, local elites (who had the best information about borrower quality) invested in agriculture by buying land and leasing it to farmers. They protected their investment by retaining the right to evict defaulting tenants. By effectively banning leases, the reform stopped them from doing this. In the process, it increased the cost of capital to farmers, slashed the amount of credit, and reduced the accuracy with which investors could target the credit. In turn, the reform's restrictions on land transfers eliminated the ability of farmers to use their land to borrow funds from banks.

I study only Japan. What happened there need not preclude the adoption of a better designed land reform program that does raise productivity somewhere else. But at least in Japan, land reform did not raise productivity. Instead, it slashed the rate of productivity growth by raising the cost of capital to farmers.

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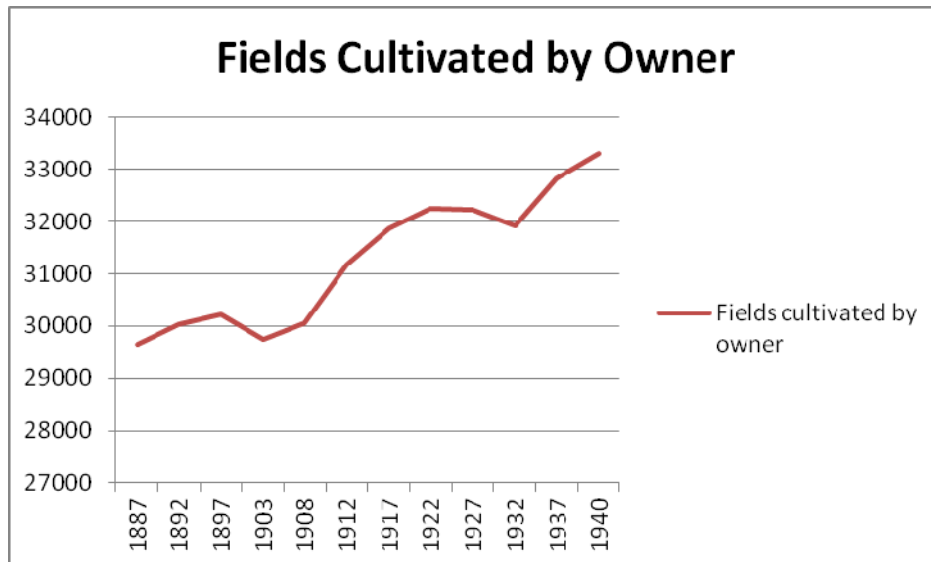
Table 1: Tenancy Rates and Total Farm Land

	Tenancy %	Farm Land
1887	39.5	49,007
1892	40.0	50,051
1897	41.2	51,396
1903	43.9	53,026
1908	45.4	55,029
1912	45.4	57,110
1917	46.2	59,243
1922	46.4	60,185
1927	46.1	59,798
1932	47.5	60,789
1937	46.8	61,694
1940	45.9	61,548

Notes: Tenancy percentage gives the percentage of farm land subject to tenancy contracts. The area of farm land is in 100 cho.

Sources: Mataji Umemura, et al., Noringyo [Agriculture and Forestries] (Tokyo: Toyo keizai shimpo sha, 1966)(Hitotsubashi Long-term Economic Statistics series, vol. 9); Takafusa Nakamura, Economic Growth in Prewar Japan (New Haven: Yale University Press, 1971) (transl. Robert A. Feldman).

Figure 1: Area under Owner Cultivation



Notes: Calculated from data given in Table 1.

Table 2: Selected Summary Statistics

	<i>Min</i>	<i>Median</i>	<i>Mean</i>	<i>Max .</i>
A. <u>Did Land Reform Raise Productivity?</u>				
Fraction paddies purchased	.232	.315	.318	.485
Productivity, 1940	9.586	20.095	19.478	26.859
Productivity, 1950	16.026	22.237	22.551	31.508
Productivity, 1955	11.290	27.013	26.152	32.117
Productivity, 1960	22.111	28.000	28.619	35.624
Productivity growth, 1935-40	-.354	.052	.077	1.191
Productivity growth, 1950-55	-.500	.212	.181	.712
Productivity growth, 1955-60	-.124	.074	.120	1.740
Absentee paddy ratio	.023	.042	.057	.203
Absentee household ratio	.107	.195	.198	.291
Land-rent ratio	28.3	37.2	41.7	93.3
Rent-paid ratio	.800	.941	.929	1.101
Fraction population rural	.142	.864	.819	1.000
Bank branches per capita	.011	.081	.084	.199
B. <u>Did Land Reform Increase Paddy Construction?</u>				
Paddy area growth 1920-25	-.894	.006	.226	9.824
Paddy area growth 1925-30	-.590	.009	.171	8.365
Paddy area growth 1930-35	-.061	-.001	.005	.206
Paddy area growth 1935-40	-.165	-.001	-.005	.045
Paddy area growth 1950-55	-.065	-.006	-.003	.068
Paddy area growth 1955-60	-.071	.018	.021	.162

Sources: Norin sho, ed., Norin sho tokei hyo [Ministry of Agriculture Statistical Tables] (Tokyo: Norin sho, various years); Norin sho, ed., Nochito kaiho jisseki chosa [Survey of Performance of Agricultural Land Liberation] (Tokyo: Norin sho, 1956); Nochi kaikaku kiroku iinkai, ed., Nochi kaikaku tenmatsu gaiyo [Summary Account of Land Reform] (Tokyo: Nousei chosa kai, 1957); Nochi kaikaku shiryō hōsan iinkai, ed., Nochi kaikakushiryō shūsei [Compilation of Material on Agricultural Land Reform], vol. 13 (Tokyo: Nousei chosa kai, 1981); Norin sho, ed., Kosaku jijo chosa [Survey of Tenancy Circumstances] (Tokyo: Norin sho, 1928); Nochi kaikaku kiroku iinkai, ed., Nochi kaikaku tenmatsu gaiyo [Summary Account of Land Reform] (Tokyo: Nousei chosa kai, 1957).

Table 3: Land Reform and Productivity Growth (I)

Dependent variable: Productivity growth, 1950-1955

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Frac paddies purch'd	-1.045** (2.15)	-1.001* (1.96)	-1.161** (2.35)	-1.327** (2.48)	-1.497** (2.34)	-1.257** (2.53)	-1.387*** (2.74)	-1.874*** (2.79)
Productivity 1940		-.003 (0.31)						
Prod'y growth, 35-40			.146 (1.15)	.143 (1.12)	.155 (1.22)	.134 (1.06)	.198 (1.54)	.197 (1.50)
Absent paddy ratio				.894 (0.82)				.226 (0.20)
Absent h-h ratio					.729 (0.83)			.820 (0.92)
Land-rent ratio						.004 (1.24)		.003 (0.93)
Rent-paid ratio							-.723 (1.61)	-.702 (1.51)
Adj. R2	.07	.06	.08	.07	.07	.09	.11	.09

Notes: All regressions are OLS. The table gives the coefficient, followed by the absolute value of the t-statistic in parenthesis. ***, **, *: statistically significant at the 1 percent, 5 percent, and 10 percent levels. n = 46.

Sources: See Table 2.

Table 4: Land Reform and Productivity Growth (II)

Dependent variable: Productivity growth, 1950-1955

	(1)	(2)	(3)	(4)	(5)	(6)
Frac paddies purch'd	-1.023* (1.90)	-1.081** (2.26)	-.959* (1.85)	-.811 (1.32)	-.833 (1.42)	-.784 (1.35)
Prod'y growth, 35-40	.125 (0.95)	.189 (1.30)	.140 (1.11)	.112 (0.84)	.129 (1.02)	.135 (1.07)
Frac pop rural	.119 (0.68)		.107 (0.63)	-.309 (1.10)		-.339 (1.28)
Bank branch, PC		1.434** (2.08)	1.418** (2.04)		1.502** (2.14)	1.547** (2.22)
Adj R2	.07	.15	.13	.01	.09	.11
n	46	46	46	40	40	40
Prefectures	All	All	All	Non-Urban	Non-Urban	Non-Urban

Notes: All regressions are OLS. The table gives the coefficient, followed by the absolute value of the t-statistic in parenthesis. ***, **, *: statistically significant at the 1 percent, 5 percent, and 10 percent levels.

Sources: See Table 2.

Table 5: 1955-60 Growth and Productivity Levels

Dependent variable:	Prod'y growth 1955-60		Productivity 1950		Productivity 1955		Productivity 1960	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Frac paddies purch'd	.705 (1.00)	.587 (0.77)	23.230*** (3.23)	17.374** (2.32)	.777 (0.09)	6.104 (0.67)	22.860*** (2.83)	23.647** (2.62)
Prod growth, 35-40	.043 (0.24)	.034 (0.18)						
Productivity, 1940			.309** (2.33)	.440*** (3.20)	.255 (1.64)	.175 (1.04)	.234 (1.57)	.318* (2.00)
Frac pop rural		-.029 (0.12)		-2.376 (1.02)		3.323 (1.16)		2.255 (0.84)
Bank branch, PC		-1.509 (1.48)		-23.983** (2.28)		12.320 (0.96)		-19.984 (1.64)
Adj R2	-.02	-.01	.30	.36	.02	.03	.21	.24

Notes: All regressions are OLS. The table gives the coefficient, followed by the absolute value of the t-statistic in parenthesis. ***, **, *: statistically significant at the 1 percent, 5 percent, and 10 percent levels. n = 46.

Sources: See Table 2.

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